in solving the extraordinary problem of *Papilio dardanus*, then known as *merope*, with its train of mimetic females. His sound conclusions were in advance of their time, and were received with incredulity, and indeed ridicule, by entomologists of that day; but he lived to see them confirmed by breeding experiments and universally accepted. The last time the present writer saw him, a few weeks before his death, he found that a new observation on *Papilio dardanus* was the one subject that restored for a moment his failing powers and brought back his old enthusiasm.

Trimen's greatest work is his fine monograph in two volumes on the butterflies of South Africa, the expansion of a smaller book he wrote when a young man. This fine work is a model not only for its high scientific value, but also for a literary grace which was characteristic of all its author's writings.

Roland Trimen was full of humour and a delightful companion, and inspired the warm affection of a wide circle of friends. By his death the world has lost the last of the six naturalists who created the modern study of insect bionomics—Darwin, Bates, Fritz Müller, Wallace, Meldola, and Trimen.

E. B. P.

NOTES.

The American Academy of Arts and Sciences has elected Sir Norman Lockyer a foreign honorary member.

It is announced that the Daylight Saving Bill has been rejected by the New Zealand House of Representatives.

We announced in our issue of March 16 last that an Association for the Advancement of Applied Optics had been formed in the city of Rochester, N.Y. We now learn of the recent formation of a national society called the Optical Society of America, of which the association at Rochester referred to by us is a section. It is proposed to hold annual meetings, and that the society shall serve as the parent organisation for local sections holding frequent meetings. It is intended to cover all branches of optics, theoretical and experimental: pure optics, lenses and optical instruments, optical glass and refractometry, colorimetry, vision, photometry, illumination, radiometry, polarimetric analysis, photography and similar related subjects; and to begin the publication of an international optical journal in January next. The officers of the society for the year are:—President, Dr. P. G. Nutting; vice-president, Dr. G. E. Hale; treasurer, Mr. A. Lomb; secretary, Dr. F. E. Ross. The executive council consists of the above-named officers and Dr. F. E. Wright, Dr. C. E. K. Mees, Mr. N. Macbeth, and Prof. J. P. C. Southall.

The fifth Brazilian Geographical Congress will be held at Bahia on September 7–16. There will be twelve sections, devoted respectively to the following subjects: Mathematical Geography (astronomical geography, topography, geodesy); Physical Geography (aerology, oceanography, geomorphology); Physical Geography (hydrography, potamology, limnology); Vulcanology and Seismology; Climatology and Medical Geography; Biogeography (phytogeography and zoogeography); Human Geography; Political and Social Geography; Economic and Commercial Geography, including Agricultural Geography; Military and Historical Geography; Teaching of Geography, Rules and Nomenclature; Regional Monographs. Papers intended for presentation must not have appeared elsewhere, must be typewritten, and reach the Secretary of the Organising Committee not later than August 30.

We learn from the *Museums Journal* for August that the present Lord Avebury has handed to the British Museum authorities, for retention in the national collection or distribution among provincial museums, certain portions of the late Lord Avebury's collection of prehistoric and ethnographical specimens from various parts of the world, use of which was made in the writing of "Prehistoric Times." The gift includes a fine series from the early Iron age cemetery at Hallstatt, Upper Austria, which will be kept in the British Museum, but many of the stone implements are available for distribution, and a list of them is given in the journal. Applications for specimens should be made to Sir Hercules Read at the British Museum.

As already announced, Sir William Henry Power, K.C.B., F.R.S., medical officer of the Local Government Board from 1900 to 1908, died on July 28 last, after a lingering illness. Greatly distinguished as an epidemiologist and administrator, his services to hygienic science and practice had extended over a period of more than forty years. Owing to a retiring disposition and a dislike for gatherings of a social nature, he was comparatively little known outside official circles. Nevertheless, during his long connection with the Local Government Board he planned and directed a large part of the work of the Medical Department, and numerous reports dealing with matters concerning the public health issued during that period were either written by him or owed much to his editorial criticism and supervision. His was a charming personality, which endeared him to all his colleagues, many of whom benefited to no small extent from his kindly help and encouragement, always so readily accorded. He was the first (in 1878) to direct attention to the dissemination of diphtheria, and later of scarlet fever, through the consumption of milk; while his classical work on the spread of smallpox from hospitals in which cases of that disease were under treatment formed the basis of legislative action resulting in the removal of smallpox hospitals out of the metropolitan area. While medical officer to the Local Government Board he also served on the General Council of Medical Education, and the Royal Commission on Tuberculosis, of which he afterwards became chairman. He was also appointed a member of the Royal Commission on Sewage Disposal. He received the C.B. in 1902, and the K.C.B. in 1908 on retirement from his official post. He was elected F.R.S. in 1895, and was awarded the Buchanan medal of the Royal Society in 1907. It is not too much to say that no man in this country has done more than Sir William Power to advance the cause of scientific hygiene.

The many friends and scientific associates of Prof. W. A. Herdman and Mrs. Herdman will sympathise deeply with them in the great grief they are at present suffering through the death in action of their only son, George Andrew Herdman. The young officer was educated at Clifton College, and was a scholar of Trinity College, Cambridge. He entered Clifton College with a mathematical scholarship, was head of his house at Clifton, came out top of the school in physics and chemistry, and won an entrance scholarship at Trinity College, Cambridge, in December, 1913. He early showed a wide and keen interest in scientific problems, and in 1914 went out to Australia with the British Association. On returning, he immediately volunteered for active service, and joined the Cambridge O.T.C. in October, 1914, was gazetted to the Liverpool Regiment in January, 1915, proceeded to the front in the following August, and, after seeing much hard service, was killed in action by a shell-burst whilst gallantly leading in a charge at the battle of the Somme on July 1 last, aged twenty years. The academic career of George A. Herdman was brilliant, but only those scientific friends who knew him personally were able to appreciate his originality of outlook and scientific independence of spirit, and to look forward to the development of a great career, which has been so untimely cut short by the cruel fate of war. Although his university career was only opening when the call to arms came, he was already deeply interested in several original problems, and had been taking physical observations on sea-water at Port Erin Marine Biological Station and on the west coast of Scotland during vacations for several years, as also on the voyage to Australia. He had recently worked assiduously and successfully with Prof. Benjamin Moore upon biochemical problems in nutrition of marine animals and plants, and questions in the physics and chemistry of photosynthesis, and he was joint author of two papers from the Port Erin Laboratory partly recording these observations: (1) "The Nutrition and Metabolism of Marine Animals: the Effects in the Lobster of Prolonged Abstention from Food in Captivity," and (2) "Seasonal Variations in the Reaction of Sea-water in relation to the Activities of Vegetable and Animal Plankton" (Trans. Biol. Soc., Liverpool, 1914 and 1915). While science deplores the early loss of such a promising young votary, those who knew him will agree that he himself would have gloried in the splendid victory won in the charge in which he fell, and counted his personal sacrifice as nothing for the honour of the cause.

IT is with great regret that we record the death of Lieut. Arthur Poynting, who was killed in action in France on July 25. Lieut. Poynting, who was thirty-three years of age, was the only son of the late Prof. J. H. Poynting, F.R.S. After a four-year course in civil engineering, he graduated as B.Sc. of Birmingham University in 1905. On leaving the University he entered the service of the Midland Railway Co., being engaged for a short time at Derby, and afterwards on the construction of Heysham Harbour. For a thesis on his work at Heysham he was awarded the degree of M.Sc. in 1909, and in the same year he was elected an associate member of the Institution of Mechanical Engineers. In 1910 he became assistant-engineer at the London and St. Katharine Docks, and a year later was transferred to the Port of London Authority as assistant to the chief engineer, by whom he was regarded as a man of exceptional ability, with a first-class knowledge of engineering, and, in addition, a special aptitude for the legal aspects of his profession. In his university days he was an enthusiastic Volunteer, and on the outbreak of the present war he obtained a commission in the 6th (Service) Battalion of the Royal Warwickshire Regiment, going to the front early in 1915. At the time of his death he was in command of a machine-gun section, and was shot by a sniper, beihg killed instantaneously. Energetic and efficient in his work, modest and kindly in his bearing, steadfast of purpose, he was indeed a very gentle, perfect knight.

LIEUT-COL. A. ST. HILL GIBBONS, who has been killed in action, was well known as an African explorer. During the 'nineties he and the men who were associated with him in his travels covered more than 20,000 miles beyond the reach of railways, mainly in remote parts of the continent. On two expeditions in 1895-6 and 1898-1900 he thoroughly explored and mapped Barotseland and other parts of the Upper Zambezi basin, tracing the Zambezi to its most remote source, and providing valuable information about the navigability of the river, the resources of the country, and the customs of its inhabitants. His routes in this region covered at least 8000 miles. His maps were based on numerous astronomical observations, as well as careful compass surveys, and the late Mr. E. G. Ravenstein formed a high opinion of their accuracy. On his second expedition, Col. Gibbons, after completing his work in Barotseland, followed the Congo-Zambezi watershed towards Lake Tanganyika, and then, striking north, made his way to the Nile Valley. Ewart Grogan was the first traveller to complete the transcontinental journey from south to north; Col. Gibbons was a close second. He lectured more than once before the Royal Geographical Society, and in 1906 was awarded by the society the Gill Memorial. After serving through the South African War, Col. Gibbons settled in northern Rhodesia, and took an active interest in the development of that territory, delivering a lecture on its resources and prospects before the Royal Colonial Institute only a few months before the outbreak of the present war.

WE regret to learn of the death, in action, on July 14, of Second Lieut. C. M. Selbie, formerly assistant-naturalist in the National Museum, Dublin. He enlisted as a private in the Royal Scots, and in January, 1915, he received a commission as second lieutenant in the Scottish Rifles, and had been at the front since November. During the two years that Lieut. Selbie spent in the National Museum of Ireland he devoted himself with energy and enthusiasm to the collections of the Myriapoda and Crustacea. He rearranged the exhibition series and also undertook to name a portion of the collections of Crustacea procured on the west coast of Ireland during the Fishery Survey of the Department of Agriculture. The following is a list of the more important notes and papers published by him:—"A New Variety of *Polydesmus coriaceus*, Porat, and Note on a Centipede Monstrosity" (*Annals and Magazine of Natural History*); "Some New Irish Myriapods" (*Irish Naturalist*); "New Records of Irish Myriapods" (*Irish Naturalist*); "The Decapoda Reptantia of the Coasts of Ireland," part i., "Palinura, Astacura, and Anomura (except Paguridea)" (Fisheries, Ireland, Sci. Invest.). In addition, he had prepared but left unpublished "The Paguridea of the Coasts of Ireland."

BY the deaths of Prof. Johannes Ranke, of the University of Munich, and of Prof. Gustav Schwalbe, of the University of Strasburg, Germany has lost two of her most renowned students of the human body. Both died full of years and honours. Their careers were remarkably alike. Ranke, who was born in 1836, did his first research on tetanus, then devoted himself to physiology, and, finally, in the early eighties, took up the study of physical anthropology, and made many and important contributions to our knowledge of that subject. For many years he was editor-in-chief of the *Archiv für Anthropologie*. Schwalbe, somewhat Ranke's junior—he was born in 1844—did his first research on Infusoria, then devoted himself to the study of the microscopic structure of tissues, his chief work being an elaborate and accurate investigation of the finer structure of the sense organs. He taught and researched at Bonn, Amsterdam, Halle, Freiburg, Jena, and Königsberg, being ultimately called to the chair of anatomy in Strasburg in 1883, where he laboured for thirty-six years. He was well known and much respected by anatomists in every country.

The work by which he is best known, his researches into the nature of fossil apes and men, he began relatively late in life. At the end of last century he had accumulated such masses of observation dealing with the anatomical evidence bearing on the origin of man that he founded and issued a journal—the *Zeitschrift für Morphologie und Anthropologie*—for the publication of papers dealing with the evolution of the higher mammals.

AMONG the promising young geologists who have given their lives for their country we regret to note the name of Lieut. Richard Roy Lewer, King's Royal Rifle Corps. He died on July 21 of wounds received a few days previously, at the age of twenty-six. He was the elder son of Mr. H. W. Lewer, of Priors, Loughton, Essex, and was educated at Denstone College, and afterwards at Wren's. On the outbreak of war he was carrying on geological exploration at Calgary, but at once returned to England to take up military duties, and was gazetted second lieutenant on September 24, 1914, and lieutenant on February 22, 1915. He was elected a fellow of the Geological Society in 1911, and joined the Geologists' Association in 1914. His principal geological work had consisted in professional oil exploration, which he had carried out in Burma, Russia, Asia, and Western Canada.

THE death is announced, at the age of sixty-nine years, of Mr. Morton A. Smale, for many years dean of the Royal Dental Hospital, examiner in dental surgery at the Royal College of Surgeons of England, and joint author of "Injuries and Diseases of the Teeth."

AT the annual meeting of the British Pharmaceutical Conference, held on July 12, the president (Dr. David Hooper) devoted his address chiefly to an account of the drug resources of India and the Colonies. India is rich in drugs; our ancestors long ago sailed thither to fetch "spices, precious stones, and drugges for the Poticaries." Amongst the products to which attention was directed are cinchona, senna, strychnine, opium, turpentine, and thymol, not to mention frankincense and myrrh, which are still sold from the godowns of Bombay. Thousands of acres of cinchona are now grown near Darjeeling and in the Nilgiri Hills, and this is noted as "a grand result in acclimatisation," due to the pioneer work of the late Sir Clements Markham. Indian henbane has been found to give a high yield of mydriatic alkaloids, which are now becoming very valuable. Cantharidin, too, is furnished in high proportion by Indian species of Mylabris. In the Malay States ipecacuanha is successfully cultivated, whilst aloes, buchu, belladonna, and monsonia are exported from South Africa. Coriander and caraway are cultivated by farmers' wives in the latter country for the sake of pin-money, and it is suggested that this example might be followed here as an inducement to grow medicinal herbs.

M. CHAMBRELENT has studied statistically the subject of still-births and deaths of infants within three days of birth in France. He finds that the annual mortality from this cause is 4 per cent. of births, that it is much greater in the towns than in the country, and that it is higher the more populous the town. This difference between town and country he considers to be due to the less hygienic conditions obtaining in the towns, to alcoholism, and to chronic maladies, particularly syphilis and tuberculosis, which are more prevalent in towns than in the country. The male sex is more affected by still-birth than the female sex. It is particularly at birth and the few days following birth that this mortality among boys is so marked, and to a considerable degree it is preventable. Illegitimacy, as might be expected, considerably augments this mortality. The older the mother, also, the greater the mortality, while it is much higher at the first pregnancy than in subsequent pregnancies. This mortality is a factor which is by no means negligible in bringing about the depopulation of France (*Revue scientifique*, July 1-8, 1916, p. 391).

THE *Indian Journal of Medical Research* for April (vol. iii., No. 4) contains a number of papers on bacteriology, parasitology, and public health. Capt. Morison discusses the dose of alum necessary for the purification of water by precipitation. He finds that the best dose of alum for the perfect clarification of a soft water is obtained by adding half the equivalent weight of alum necessary to react completely with the alkalinity calculated as calcium carbonate. For a hard water the same rule holds good; but an equally good clarification can be obtained by the use of a smaller dose and a mechanical filter. A watery solution of hæmatoxylin gives a reddish colour when the correct dose has been given.

IN second series, part ii., vol. xvi., of the Journal of the Academy of Natural Sciences, Philadelphia, Mr. C. B. Moore presents an elaborate memoir on the exploration of aboriginal sites in the Tennessee River valley. The report would have been more valuable if it had been accompanied by a summary and some attempt to assign the remains to a particular tribe or group of tribes; but it contains abundant materials for a study of Indian mortuary customs. The district has suffered much from the depredations of curio-hunters, and the trade of "faking" flint implements seems to be a thriving one. The finest thing found is a splendid native pipe, cut in Catlinite or some similar red stone, representing a figure bent on one knee, the bowl and place for the mouthpiece being in the back of the carving. It would be difficult to exaggerate the importance of this admirable specimen, which may be regarded as one of the best examples of the art of the aborigines. He also found specimens of a reel-shaped decoration in copper, which seems to have served as a pendant or breast ornament. Only one other specimen of this type appears to be in existence. We have also the record of the first discovery of cowrie shells in an aboriginal mound. The date and mode of their introduction are questions of some difficulty, and Dr. W. H. Dall, writing to the author, says:—"Your cowries may have come off one of Columbus's own ships!"

IN vol. lxiv., No. 3322, of the Journal of the Royal Society of Arts, Sirdar Daljit Singh, of the India Council, gives a good account of the Sikhs. The sect at present numbers about five millions. It is well to have a description by an expert of the remarkable rite of *pahul*, or initiation. An iron vessel is brought into the assemblage, in which a mixture of water and sugar is placed. This is stirred with the point of a sword while the Japji and a collection of sayings of Guru Govind, who died a martyr in the time of the Emperor Aurangzeb, are recited. Some of the mixture is poured over the heads of the candidates for initiation, and the rest is drunk. The Sirdar rightly directs attention to the fact that Sikhism is a literary religion, and to the beauties of the Granth, or Scripture, of the sect. He also pays a well-deserved tribute to the loyalty and bravery of his brethren in the present war.

THE apparent ease with which the ancient Egyptians cut so stubborn a material as granite has long occupied the attention of Egyptologists. In part iii. of *Ancient*

Egypt for 1916 Mr. Somers Clarke describes how granite boulders from which building stone for the Aswan Dam was procured were dealt with by a party of quarrymen imported from Baveno, in North Italy. A vertical cut was made across the boulder, and it was split by wedges, each group containing two pairs of wedges side by side, driven into holes made with steel points. Dressing was done by means of a heavy metal tool, not unlike an adze, with its sharp end serrated. This was let fall vertically on the face of the stone, and by means of it all inequalities were removed. In the same connection, Mrs. Bertha Broadwood describes the method in use at the granite hills in Mysore. A line of small hollows is worked on the surface of the rock, a little straw is burnt over the hollows, a cupful of water is poured in, and the rock is thus split along the line of hollows to the depth of several inches. It may also be noticed that "feathers," or slips, of sheet metal are in Egypt placed on each side of the wedges to prevent them from crushing and grinding the edges of the grooves, which would waste the force used in merely enlarging the hole. These do not seem to have been used before Roman times.

A RECENT number of the *Bulletin of Entomological Research* (vol. vii., part 1) contains, among other papers, one by Dr. A. E. Cameron describing some experiments on the breeding of the mangold-fly. This student has already identified this common farm pest (*Pegomyia betae,* Curtis) as *P. hyoscyami,* Panz., the maggots of which often mine the leaves of Belladonna and other Solanaceæ. He now shows that flies reared from Belladonna will, in the absence of that plant, lay eggs on mangold leaves, in which the maggots complete their transformations. Curiously, flies reared from mangolds could not be induced to lay eggs on the closely allied sugar-beet. The dock-mining maggots belong to a distinct species of Pegomyia—*P. bicolor,* Wied—which will not lay eggs on either mangold or beet.

ANOTHER destructive dipteran crop pest of the British Islands, the cabbage-root maggot (*Phorbia brassicae*), which is also common and harmful in North America, is described at length by A. Gibson and R. C. Treherne in Bulletin 12 of the Canadian Department of Agriculture (Entomological Branch). The nearly allied *P. fusciceps* and the onion maggot (*Hylemyia antiqua*) are also dealt with. This bulletin is important for the careful records of generations through the yearly cycle and the variation in the numbers of eggs laid in the different months; also for some excellent photographs of the damage caused by the maggots to plants. It is noteworthy that the tarred discs for protecting cabbage plants from egg-laying by the fly are "widely used by market gardeners" in Canada, whereas suggestions to try them in these countries usually give rise to contemptuous amusement. The larvæ of *P. fusciceps* eat a great variety of plants, but occasionally they seek a change of diet by devouring locusts' eggs.

PUBLICATION 253 of the Queensland Geological Survey contains a description by R. J. Tillyard of some Mesozoic and Tertiary insects, mostly collected by the chief Government geologist, B. Dunstan, who contributes notes on the stratigraphical position. Most of the specimens come from a thin bed in the Coal Measures of Ipswich, South Queensland, for which a Triassic age is now claimed. These represent new genera of Blattoidea (1), Protorthoptera (2), Coleoptera (2), Mecoptera (1), Protohemiptera (1), and Hemiptera (1), besides a new and interesting archaic Odonate and the wing of a supposed Lepidopteron (Dunstania, n.g.), which, however, is perhaps more comparable with such a Dipteron as Psychoda. Triassic insects are little known, and we are glad to learn that this is only a foretaste of what may be expected from the Ipswich bed, in which the combination of archaic with more modern specialised types is particularly marked. From the Jurassic Wianamatta shales of St. Peter's, near Sydney, are some new genera of Blattoidea and Coleoptera, as well as a Protorthopteron, Mesotitan, with a forewing estimated to measure 9 in. by 3 in., recalling the huge Titanophasma of the Commentry Coal Measures, and affording yet another instance of the persistence of archaic types in the Australian fauna. The wing of a Neuropteron from the Tertiary shales of Goodna, Queensland, is referred to the Osmylidæ under the new generic name, Euporismites. The poor impressions of a dragon-fly larva from the Tertiary or Cretaceous shale of Duaringa scarcely warrant the introduction of a new generic name, even if it were ever wise to base a new genus on the larva alone.

THE New South Wales Department of Mines is publishing a very elaborate monograph upon the geology and mineral resources of the southern coalfield, of which part i., dealing with the south coastal portion, by Mr. L. F. Harper, has just been issued in the form of a handsome volume of more than 400 pages with numerous illustrations. The Permo-Carboniferous formations within the area described are divided into four series, namely, (1) upper (Bulli-Newcastle) coal measures, (2) middle (East Maitland or Tomago) coal measures, (3) upper marine series, (4) lower (Clyde-Greta) coal measures. The upper marine series has not been found to contain any productive coal seams, and only the first-named series has hitherto been found to be of any value as a coal producer, the seams of the middle coal measures being of poor quality, whilst the areas of the lower coal measures are comparatively small, and the coal in them is of variable quality. The workable area of the upper coal measures is estimated at about 350 square miles; it contains seven coal horizons, of which the uppermost, or Bulli, coal seam is practically the sole source of coal supply. This seam appears to vary from 2 ft. to 9 ft. in thickness, and "rolls" and wash-outs appear to be numerous. The coal is of fair quality, but contains a rather high percentage of ash. The geology of the coal seams as exposed in the various collieries is described in much detail in the memoir.

THE Transactions of the Geological Society of South Africa, vol. xviii. (1916), include a long paper by Mr. E. T. Mellor on the Upper Witwatersrand system, in which a case is made out for a deltaic origin of a large part of the strata. The quartzites, banded iron-ores, and other features interestingly resemble those of the Algonkian beds of North America. In the discussion on this paper (Proc., *ibid.*, p. 42) Prof. Schwarz regards the conglomeratic layers as incompatible with delta-flats, and as produced by temporary floods running from mountain-sides over the accumulations of normally dry plain-lands.

THE term "peneplain" has undergone modification in meaning, and sometimes in spelling, since it was first introduced by Prof. W. M. Davis in 1889. In the *Geographical Review* for June, vol. i., No. 6, Prof. D. W. Johnson, of Columbia University, pleads for an extension, and at the same time precision, in its use. He suggests writing the word "peneplane" and using it for the penultimate stage in any cycle of erosion. The word "plane" he would use for the level erosion surface produced in the ultimate stage, and "plain," as generally used, for a low-relief region of horizontal rocks. The question is, of course, a technical one for geographers to decide, and Prof. Johnson's short paper is worth consideration.

In recent years the intercorrelation of meteorological data in different parts of the world has suggested important results which promise to have considerable economic value. Dr. G. T. Walker, Director-General of Observatories in India, has published a memorandum regarding the probable amount of monsoon rainfall in 1916 (Simla: Government Press; 8 annas). Data from South America, the Indian Ocean, and Ceylon, as well as from India, are briefly considered, and the result is to lead Dr. Walker to suggest that the outlook for the general monsoon rainfall of India is on the whole unfavourable this year, and that the rainfall is likely to be in slight or moderate defect, at any rate in the earlier part of the season. The deficiency is likely to be most marked in north-west India, while conditions appear to be favourable in Lower Burma, Assam, Malabar, and south-east Madras. Forecasting of this nature is still in its infancy, but Dr. Walker's attempt is most interesting, and promises to grow in value year by year.

The August "Catalogue of Books in Standard Literature" of Mr. F. Edwards, High Street, Marylebone, contains many works dealing with general natural history, botany, conchology, ornithology, mammalia, entomology, and ichthyology.

OUR ASTRONOMICAL COLUMN.

The August Meteors.—Mr. Denning writes:—"There is every indication that the Perseid display of 1916 will be of rather unusual activity. The shower was quite rich on July 31, August 1 and 5, and evidently increasing. Some fine meteors were observed, and especially on July 26, 10h. 7m., August 2, 11h. 41m., August 3, 9h. 44m., and August 5, 9h. 14m. That on the latter date was a fireball, and it formed a brilliant spectacle as seen from Bristol, falling from Cygnus to Ophiuchus.

"The maximum of the shower will probably be attained on Friday, August 11, but there will be many meteors visible also on August 12. The display is one noted for its long duration, but the really active phase of the phenomenon is included within one or two nights.

"The average height of the Perseids is from 81 to 53 miles, and their velocity 38 miles per second. Their flights are directed from the north-eastern sky, the radiant at 44°+57° in Perseus being situated in that quarter of the heavens.

"The time of maximum should be carefully determined, and the horary numbers ascertained during the nights of August 11 and 12. The moon, however, being very nearly full, will prevent many of the smaller meteors being observed.

"The more brilliant objects should be especially noted, and their paths among the stars recorded as accurately as possible. The phosphorescent streaks which are generated along the courses enable the direction to be exactly registered on a star map or celestial globe. These Perseids furnish many fine meteors, and fireballs frequently occur among them. In the case of one of the streaks or afterglows remaining visible for several minutes, its drift amongst the neighbouring stars should be noted as precisely as possible."

July Meteors.—Mr. Denning writes:—"The very fine summer weather prevailing during the latter half of July enabled a large number of observations to be obtained. The first Perseids were detected on July 8, but the shower was not very prominent until July 31 and August 1. A splendid meteor was seen from it, or possibly from a contemporary display in the same region, on July 26, at 10h. 7m.

"There was a very active radiant of slow and brilliant meteors from the point at about 302°−8° from July 7 to the end of the month, and it was still visible on August 2. Twenty of its meteors were recorded at Bristol, and many others were seen by Mrs. Fiammetta Wilson at Totteridge. Six of the meteors were doubly observed, and their real paths have been computed.

"During the last week of the month the Aquarid shower came actively into play from 338°−11°. This stream has been only scantily visible in the past few years, but its return in 1916 showed it to have recovered its old-time prominence. The chief radiants seen were:—

	° °		
July 31	31+53½	8 ↨'s	Perseids
August 1	31+55	10 ↨'s	,,
July 25–29	36+47	7 ↨'s	θ Perseids
July 7–August 2	302−8	20 ↨'s	α Capricornids
July 23–August 1 ...	302+24	6 ↨'s	Sagittids
July 23–29	333+58	7 ↨'s	ζ Cepheids
July 23–August 1 ...	338−11	12 ↨'s	δ Aquarids

"The more interesting real paths were:—

July	G.M.T. h.	m.	Mags.	Height at first. Miles	Height at end. Miles	Path. Miles	Velocity per sec. Miles	Radiant Point ° °
8	11	59	>♃−♀	77	51	121	32	22+24
19	10	18½	1−1	76	51	60	26	301−8
25	10	13½	2−2	89	55	40	48	334+57
,,	11	14	>1−>♃	70	41	61	25	302−8½
,,	11	32	>♀−2+♀	62	44	37	18	302−9
,,	11	39	2−♂	61	41	46	23	301−10
26	10	7	>♃−>♀	86	49	91	37	35+51
27	10	34½	>1−>1	69	60	52	37	338−14
,,	10	15½	3−2	59	51	18	18	301−9
,,	10	45½	4−3	69	43	36	54	332+25
29	10	3	>1−>♃	78	55	49	24	303−7
,,	10	10½	2−>1	84	58	118	48	5+13
31	10	39	5−4	61	55	80	40	342−16

"Observers—Mrs. Fiammetta Wilson, Totteridge; Miss A. Grace Cook, Stowmarket; and the writer, Bristol."

A Sun-spot in High Latitude.—In the course of the heliographic work at Greenwich, it has been found that photographs of the sun taken at the Cape Observatory on December 26, 1915, show a small, but unmistakable, spot in the extraordinary latitude 59·6° S. This is considerably above that of the spot observed by Peters in 1846, the latitude of which was 50·4°, and is apparently the highest yet recorded (Journal B.A.A., vol. xxvi., p. 292).

Lowest effective Power of a Telescope.—It has usually been considered that the lowest power which can be employed on a telescope, while retaining full illumination, is one of five to each inch of aperture, this estimate being based on the assumption that the average diameter of the pupil of the eye is one-fifth of an inch. Mr. W. H. Steavenson has investigated the diameter of the pupil by flashlight photography, and has found that while one-fifth of an inch may be a fair estimate of the aperture in daylight, one-third of an inch is much nearer the aperture at night. An interesting application of this result has been made by Naval Instructor M. A. Ainslie, R.N., in connection with the 72-in. mirror of the Rosse reflector, now included in the collections at the Science Museum. The "original" eyepiece of the great telescope has been found to have an equivalent focal length of 7·7 in., giving a magnifying power of 84 and an emergent pencil of 0·855 in. diameter. It follows that the effective aperture of the speculum, when this